FEBRUARY 1978
No. 2

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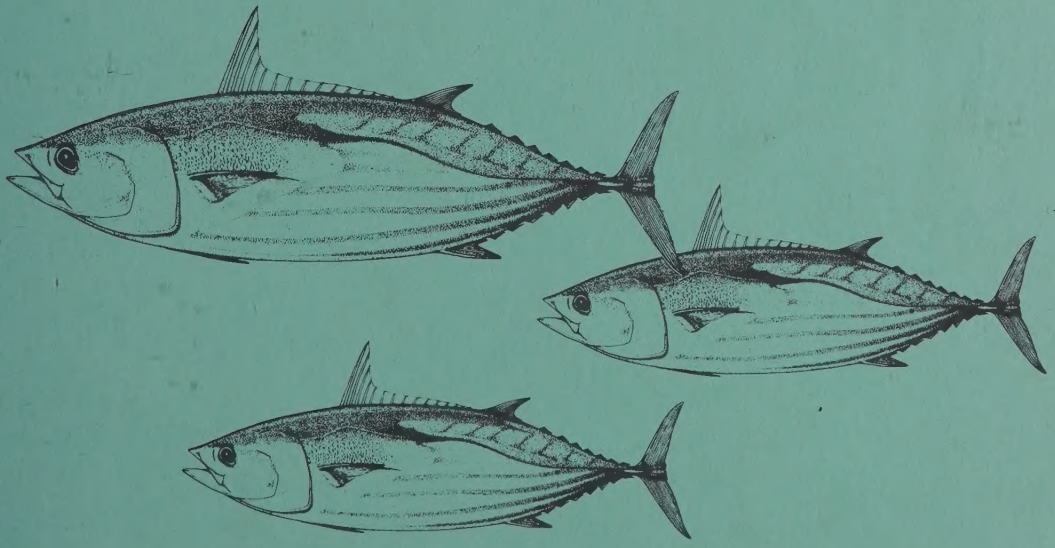
Southwest Fisheries Center-La Jolla, California



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FEBRUARY 1978, No. 2

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. It contains a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distributio and locations of productive fishing areas, information on oceanographic and atmospheric conditions and other information as is appropriate during the albacore fishing season.

Submitted for publication - March 22, 1978

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ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, and 15 day Supplement)

TECHNICAL EDITOR:
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R. Allen, H. Orr

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J. Redhead at Langara Island Light; C.T. Hilliar at Cape St. James Light;
L. Collins at Kains Island Light; M.V. Stewart at
Amphitrite Point Light

Scripps Institution of Oceanography, La Jolla, California

Expendable bathythermograph and salinity observations are made by the mates and engineers of the *Hawaiian Queen* of the Matson Navigation Co. The data are processed under supervision of D.R. McLain at the NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Science Foundation and the Office of Naval Research.

Sea Surface Temperature and Environmental Conditions

Forrest R. Miller

Eastern North Pacific

During February the Aleutian low pressure center is normally located near 55°N, 175°W and the eastern subtropical high pressure center is near 30°N, 130°W (Figure 1). Storm systems usually develop and intensify between 35°N and 45°N in the central Pacific and move rapidly in an east to northeast direction toward the U.S. west coast. Heavy rains and wide bands of clouds associated with strong surface winds develop around the storm centers, resulting in very little solar heating and increased wind mixing in the surface layers of the ocean, which leads to cooling along the storm paths.

In February 1978 the Aleutian low and the subtropical high pressure centers were displaced southeast of their normal positions (Figures 1 and 2). As a result of frequent and intense storm development along the southern periphery of the Aleutian low from 35°N to 45°N, surface pressures in the central part of the eastern Pacific were 8 to 15 millibars below normal and surface wind speeds were several knots above normal north of 35°N between 140°W and 170°W (Figure 2).

Stronger than normal north-south sea surface temperature (SST) gradients appeared in several areas from 25°N to 45°N west of 140°W (Figure 3), primarily as a result of widespread wind mixing around storm centers and along weather fronts. These weather systems developed frequently and moved eastward very rapidly, leaving in their paths rough seas and a deep mixed layer over a wider than normal latitude. The broad zones of negative SST departures (Figure 5) between 30°N and 45°N and west of 140°W were the result of continued wind stress and mixing in the upper layers of the ocean. East of 140°W the SST departures were above normal as a result of strong southerly winds ahead of the storms, which moved warmer subtropical surface layers of air and ocean northward. In addition, the transport of colder water moving southward in the California Current was periodically inhibited by the intensification of storms and increased southerly winds. Comparing February 1977 to 1978 reveals that SST's east of 130°W were above normal in about the same amount during both years (Figure 7). However, in 1977 SST's were above normal because of weak winds and clear skies associated with a persistent high pressure ridge along the U.S. west coast. This was a different condition than in February 1978 when storms prevailed along the coast. In the central part of the eastern Pacific, the negative SST departures in February 1977 were larger than in 1978 because of a very deep low pressure system that persisted during the winter of 1977 south of the Aleutian Islands. As a result, there was a large area of SST differences between the 2 years in the central Pacific west of 150°W. An exception to this was centered near 30°N, 145°N (Figure 7) where storm intensification in 1978 was apparently greater than in 1977.

Western North Pacific

In February, storms frequently develop along the western periphery of the Aleutian low between 30°N and 40°N east of Japan and move into the central Pacific where they intensify south of the Aleutian low center. Associated with the western Pacific storm development is an increase in sea surface pressure gradients and surface winds, especially north of 30°N. An east-west oriented high pressure system is normally found south of 30°N and extends westward to join the high pressure system over the Asian continent.

During February 1978 the western Pacific north of 30°N and east of Japan was dominated by a cyclonic circulation around the western extension of the Aleutian low. Sea surface pressures were 4 to 10 millibars below normal between Japan and the Aleutian low center. The north Pacific ocean front was most intense from 40°N and 45°N between northern Japan and 170°W (Figure 4) where strong northerly winds and southward moving ocean currents converged with westerly winds and the Kuroshio (Japanese) Current that moves north and eastward from Japan. The area centered around 40°N, where ocean currents and atmospheric surface winds converge, had alternating

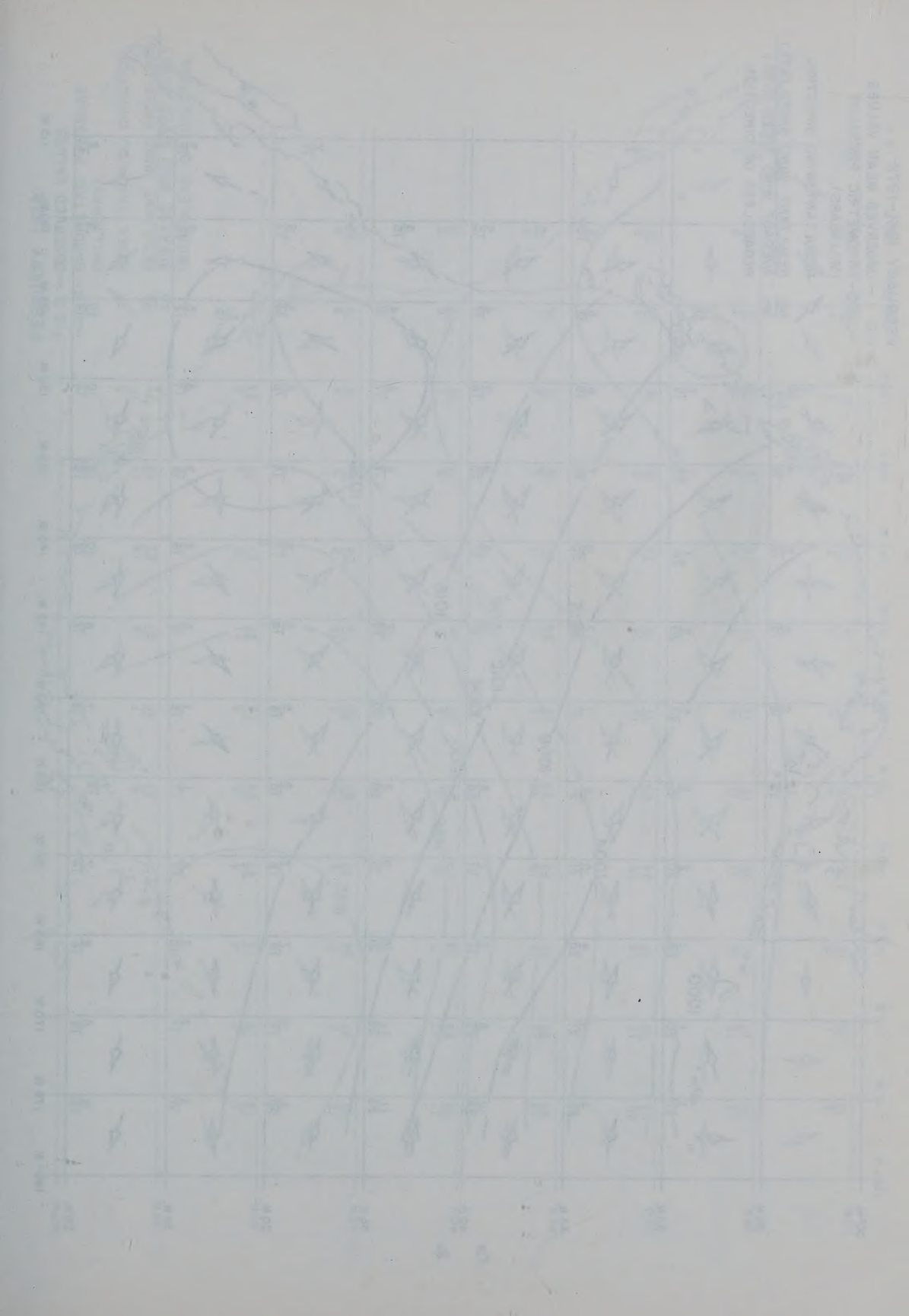
positive and negative SST departures from normal (Figure 7) extending along either side of the ocean frontal boundary. Between 150°E and 170°E the ocean front was weaker than to the east or west, due to warm water transport and/or decreased wind mixing in the surface layers. This led to the development of positive SST departures where the frontal boundary was pushed northward. East of 160°E from 35°N to 45°N a large area of negative SST departures developed where surface winds were stronger than normal in the newly developed storms that subsequently moved eastward across the mid-Pacific. South of 35°N positive SST departures prevailed in most areas because of the lighter winds and relatively clear skies associated with the western Pacific subtropical high pressure system.

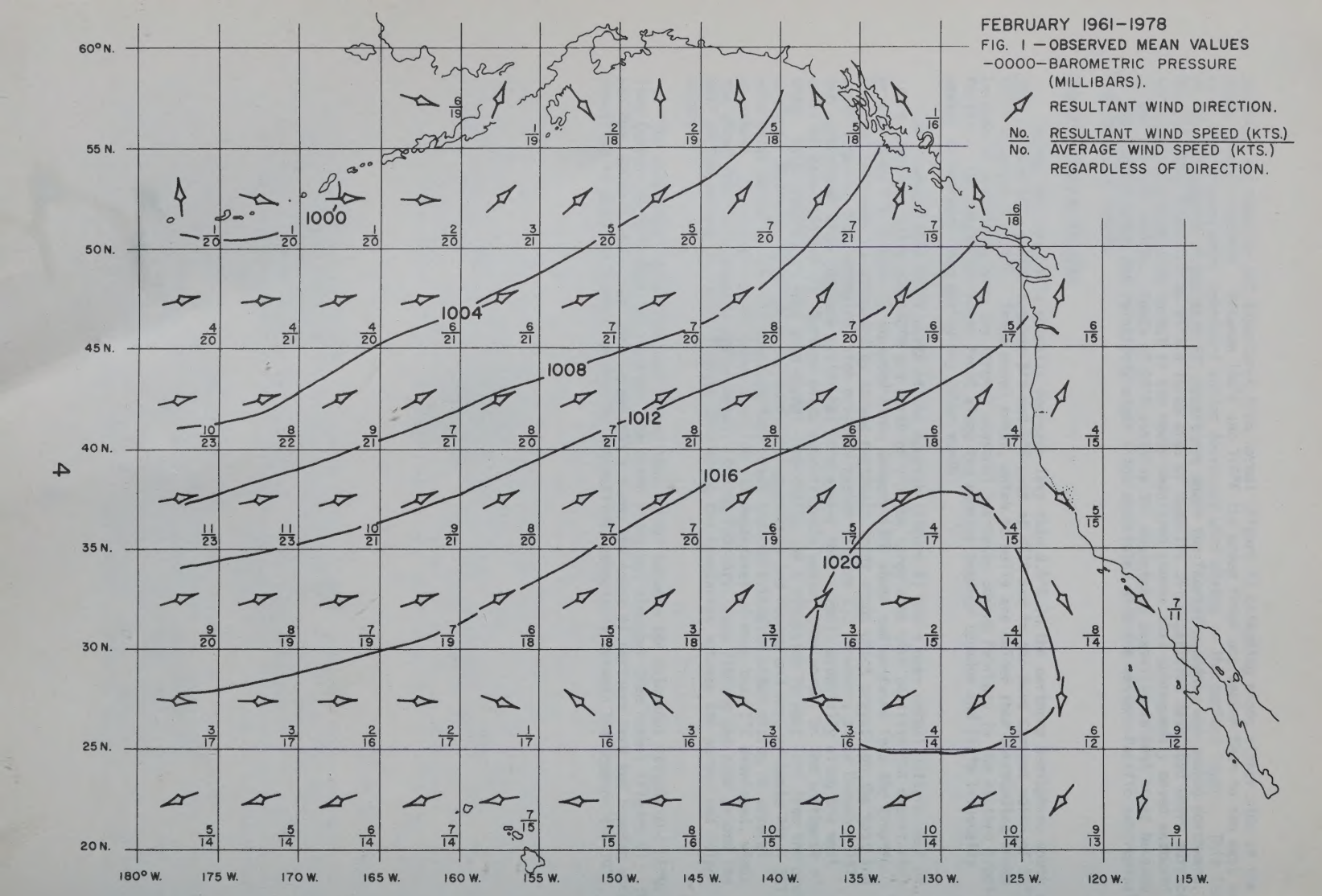
Eastern Tropical Pacific

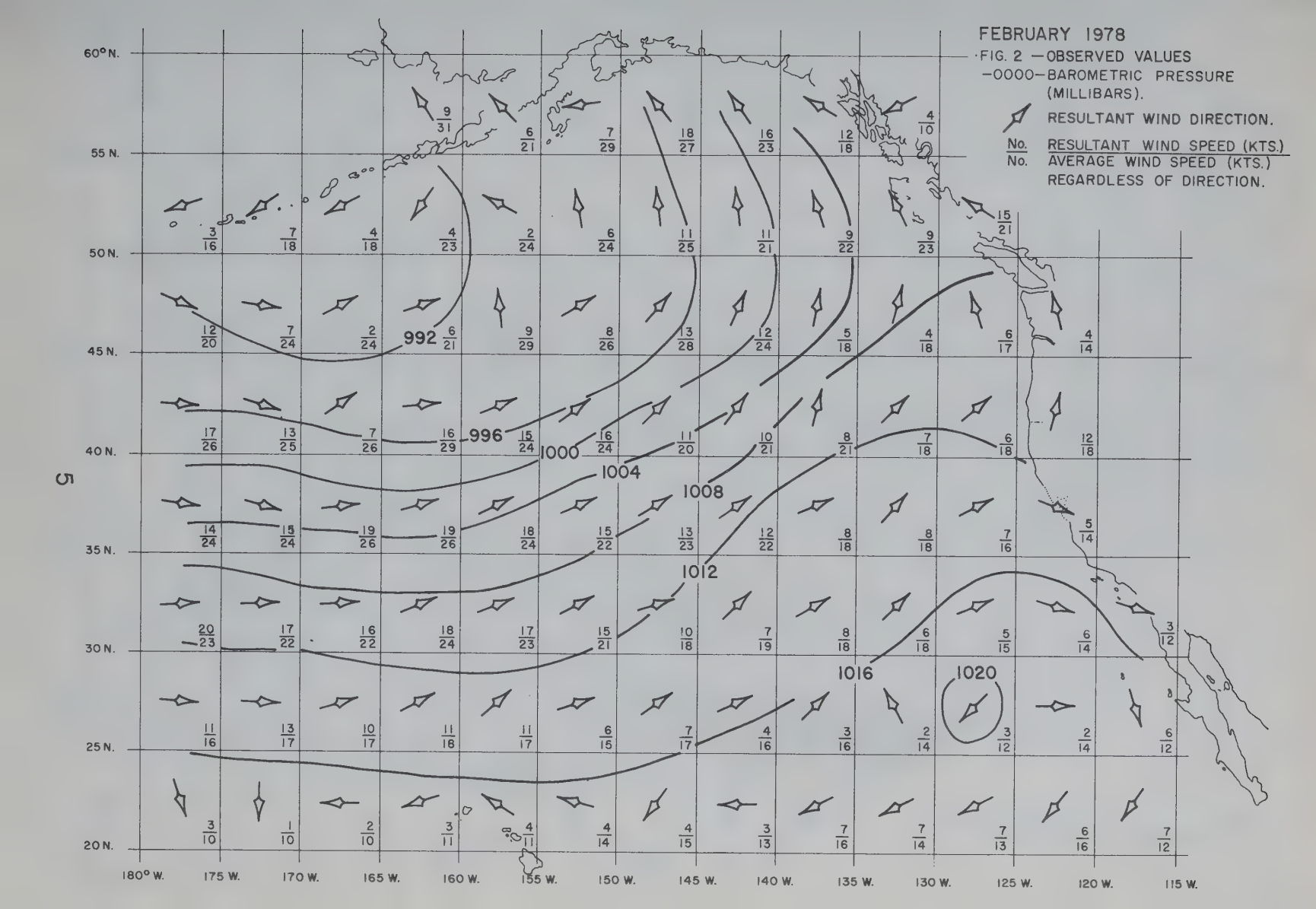
During February SST's normally decrease less than 0.5°C in the northern hemisphere south of 30°N. Along the equator between 5°N and 5°S east of 95°W and in the Peru Current north of 20°S, SST's increase 1 to 2°C. These ocean areas, which normally are colder than surrounding areas because of upwelling, have the largest seasonal increases during February in the eastern tropical Pacific. The equatorial ocean front along the equator between Ecuador and 110°W is usually weaker in February than during any other month.

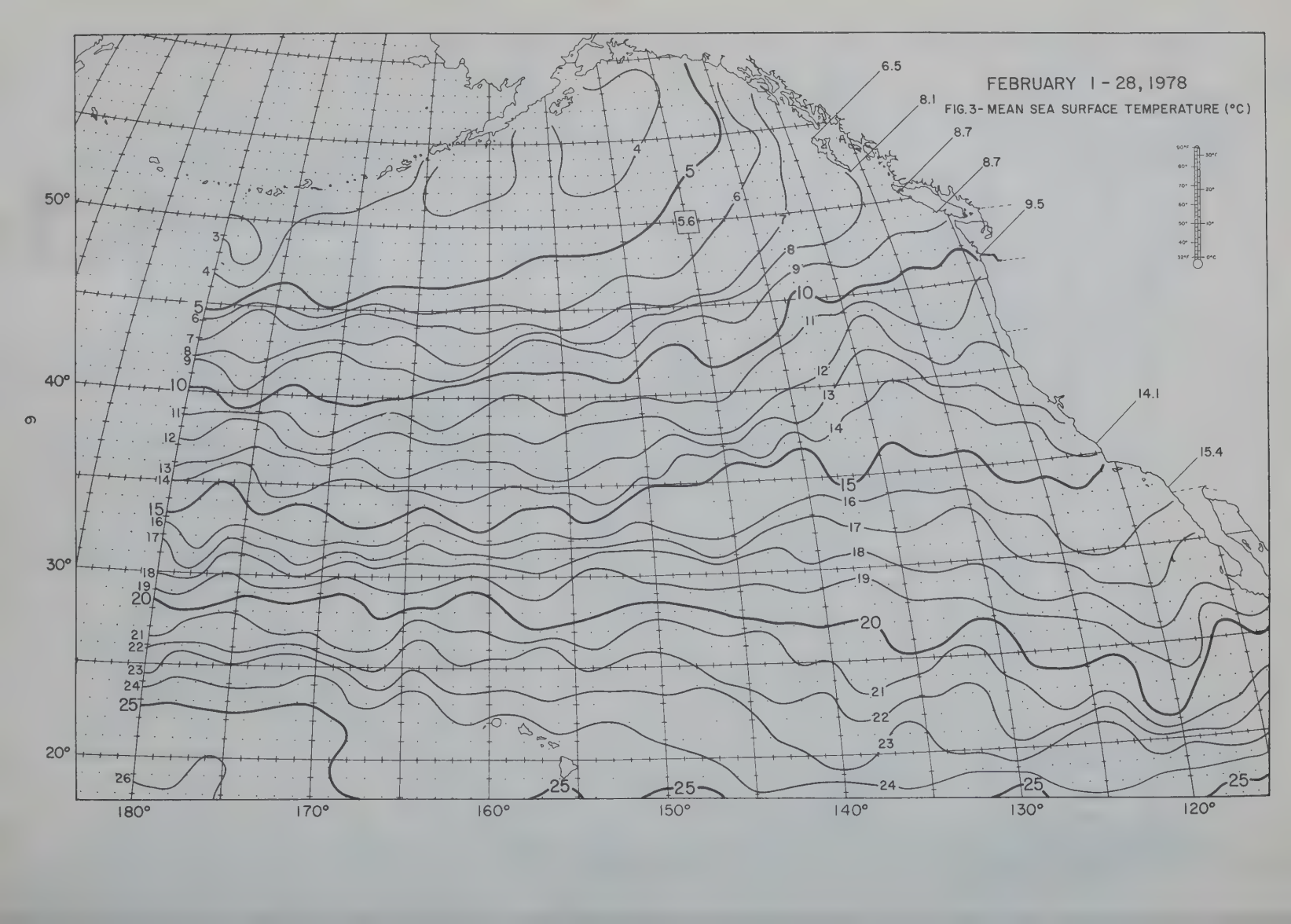
In February 1978 SST's north of the equator (Figure 8) had a near normal pattern west of 140°W. Between 105°W and 140°W and north of 5°N the large area with positive SST departures greater than 1°C (Figure 9) expanded since January 1978 south and westward into the tropics. Usually, this area is dominated by strong northeast trade winds which prevail on the east and south sides of the subtropical high pressure system (Figure 2). However, since December 1977 the subtropical high pressure system has been weaker than normal, especially along the west coast of Baja California. Surface winds were slightly weaker than normal to the southwest of Baja. This resulted in less than normal wind mixing and a reduction in heat loss from the ocean surface. Extending south from the Gulfs of Tehuantepec and Panama and west of Costa Rica, SST's were below normal (Figure 9) where surface winds induced extensive ocean mixing on several occasions. In adjacent areas where positive SST departures of more than 1°C developed, winds and cloud cover were usually below normal. During February, tuna fishing was good around the Gulf of Tehauntepec and west of Costa Rica along the boundaries between the warmer and colder water.

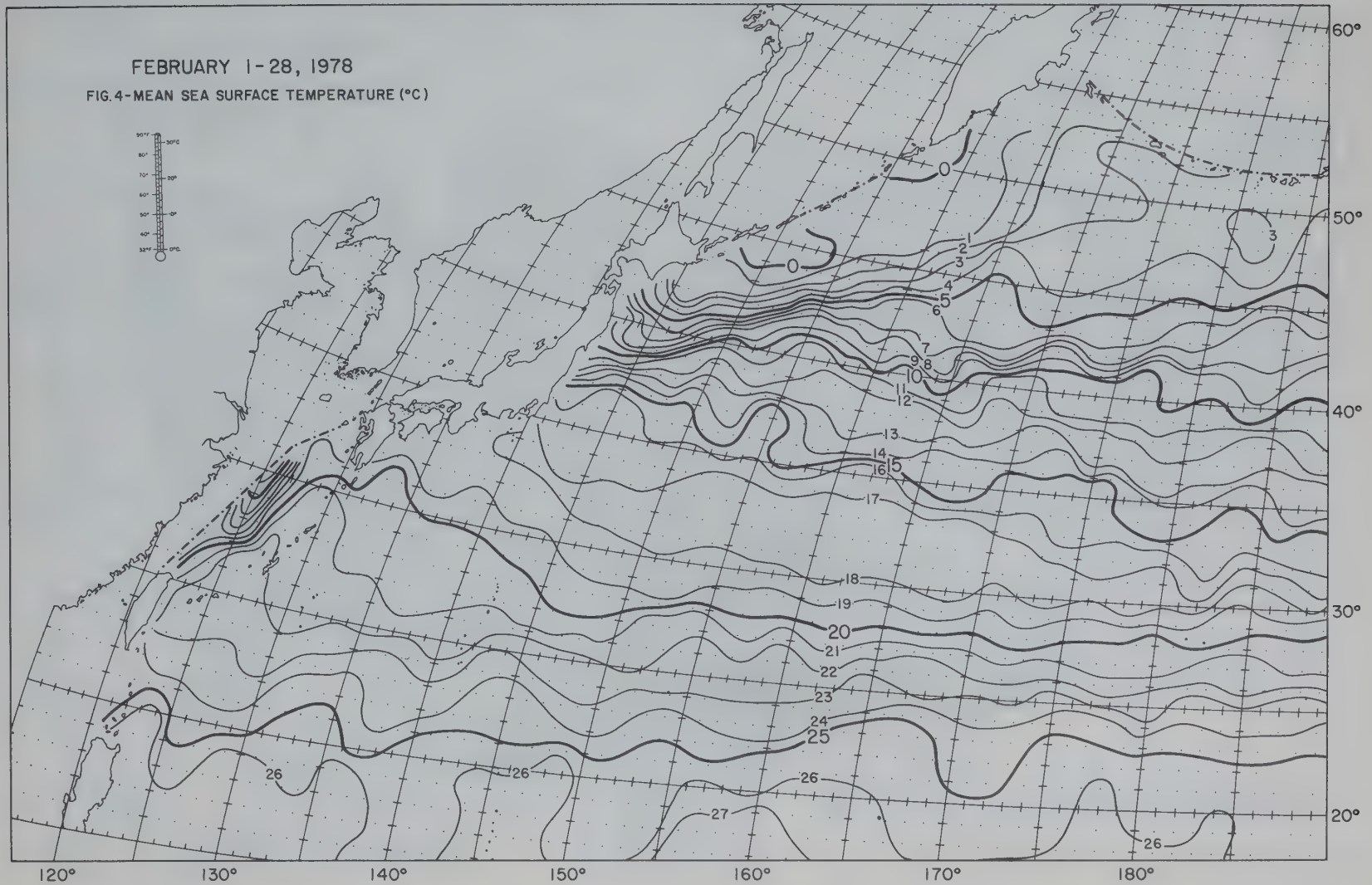
The equatorial ocean front was weaker than normal between the Galapagos Islands and 85°W. From Ecuador to 85°W near the equator, the ocean front was stronger than normal (Figure 8). This was due, in part, to colder than normal SST's along the coast of northern Peru and Ecuador where upwelling in the Peru Current apparently intensified, especially between the equator and 10°S.




FEBRUARY 1961–1978
FIG. 1 — OBSERVED MEAN VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1000
1004
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


FEBRUARY 1978
FIG. 2 —OBSERVED VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
992
996
1000
1004
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


FEBRUARY 1 - 28, 1978
FIG.3- MEAN SEA SURFACE TEMPERATURE (°C)
6.5
8.1
8.7
8.7
9.5
14.1
15.4
5.6
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


FEBRUARY 1-28, 1978
FIG. 4-MEAN SEA SURFACE TEMPERATURE (°C)
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
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25
26
27

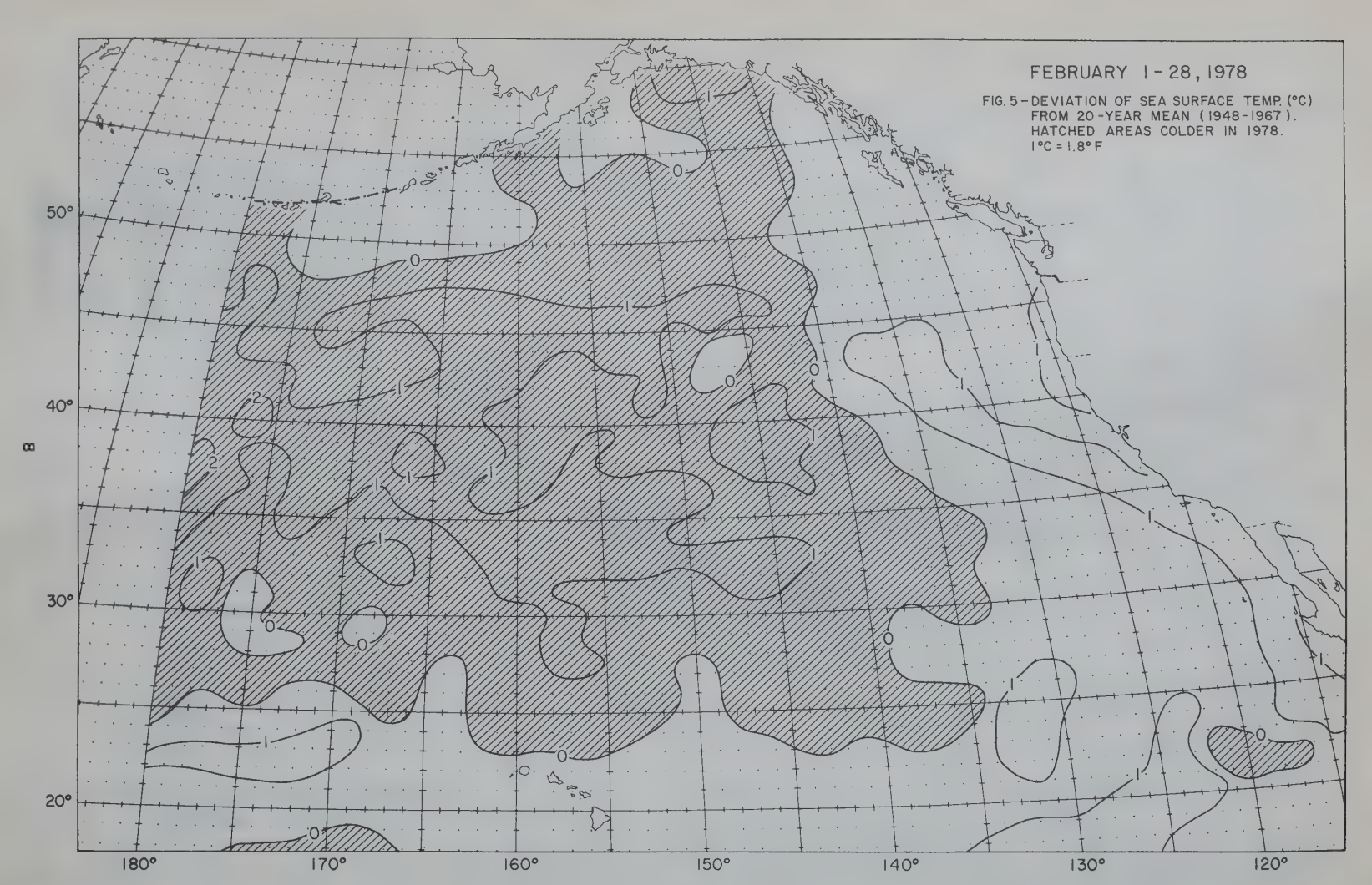
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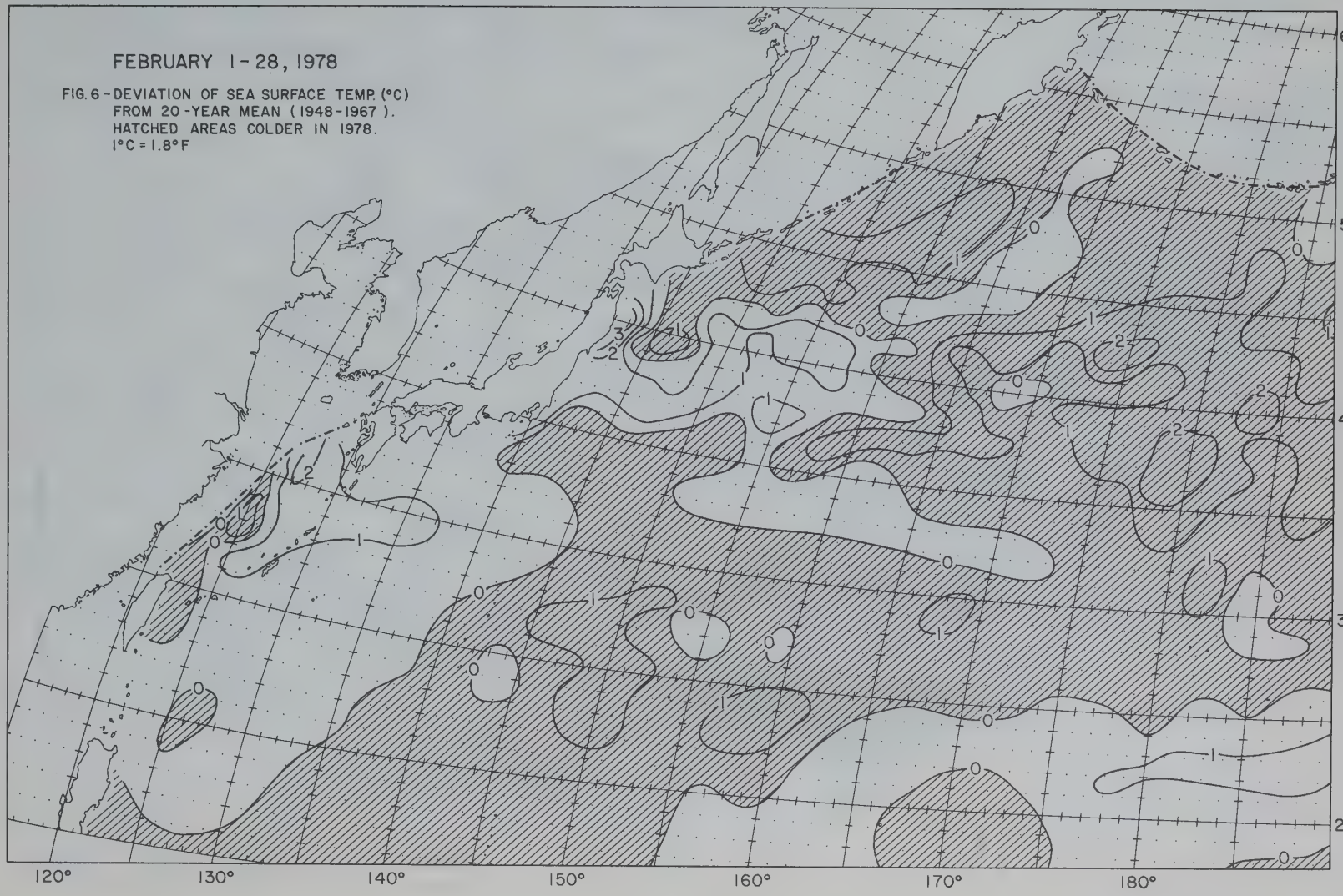
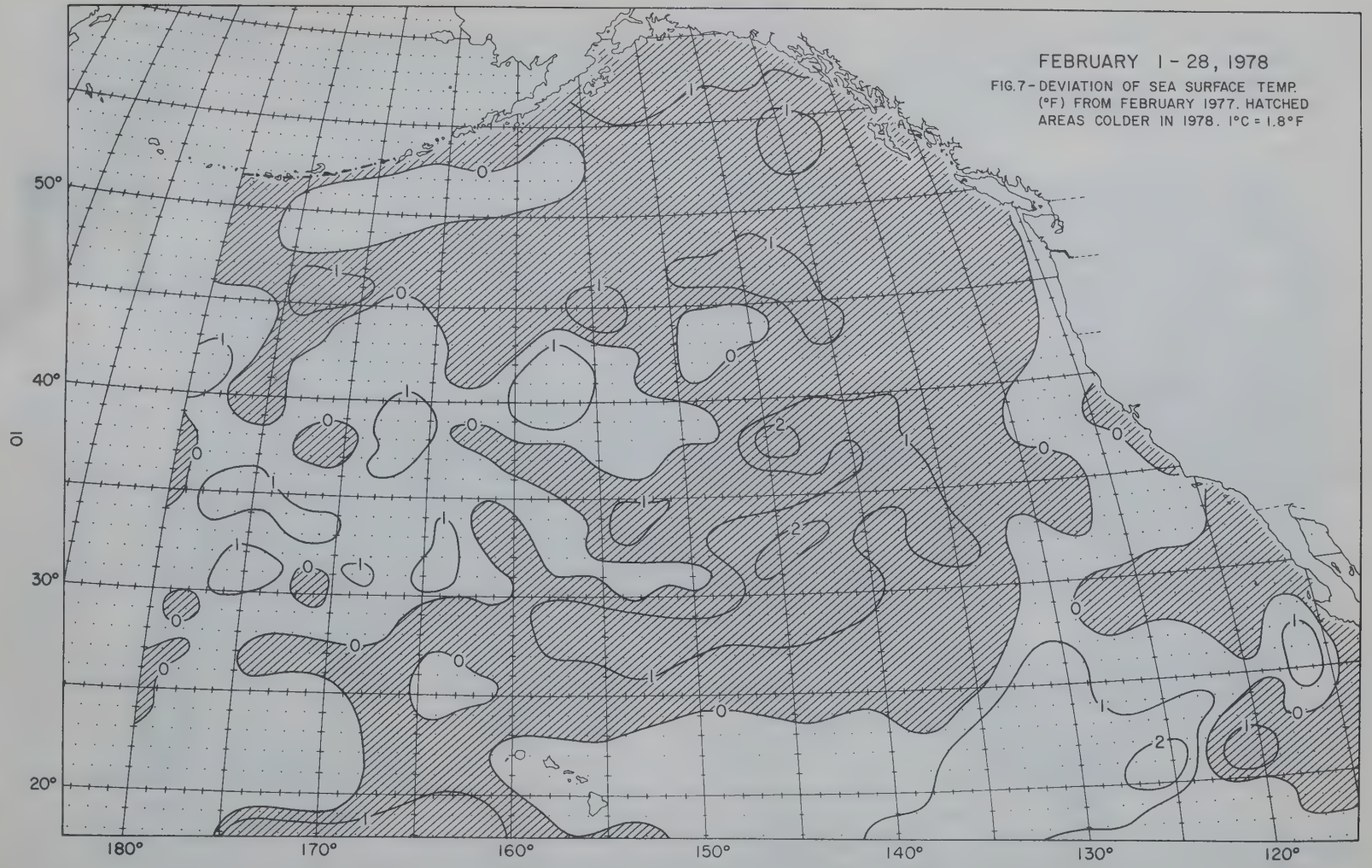
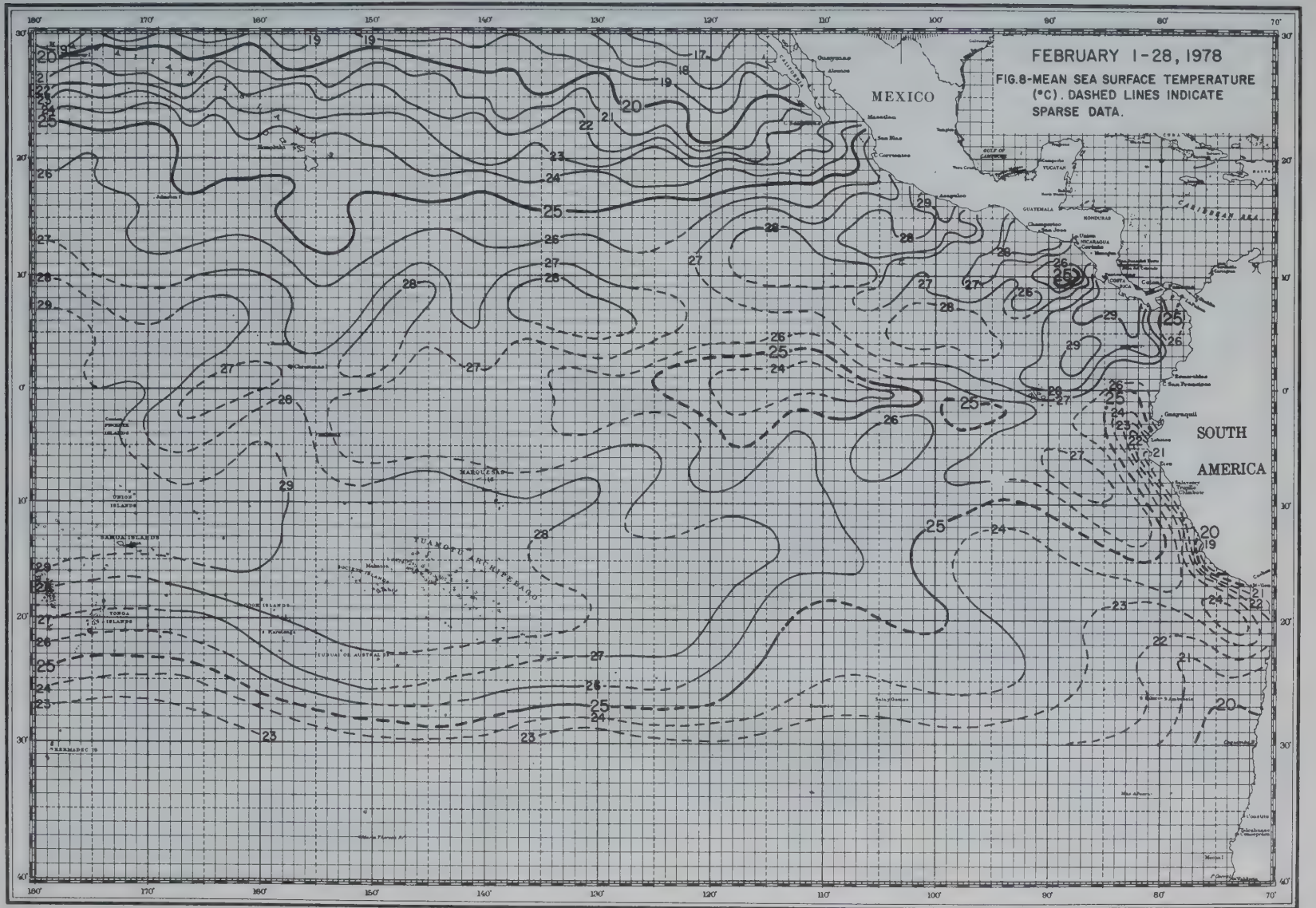
FIG. 5 - DEVIATION OF SEA SURFACE TEMP. (°C) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1978.
1°C = 1.8° F
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


FEBRUARY 1-28, 1978
FIG. 6 - DEVIATION OF SEA SURFACE TEMP. (°C) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1978.
1°C = 1.8°F
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


FEBRUARY 1 - 28, 1978
FIG.7 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM FEBRUARY 1977. HATCHED AREAS COLDER IN 1978. 1°C = 1.8°F
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
10


FEBRUARY 1-28, 1978
FIG.8-MEAN SEA SURFACE TEMPERATURE (°C). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°

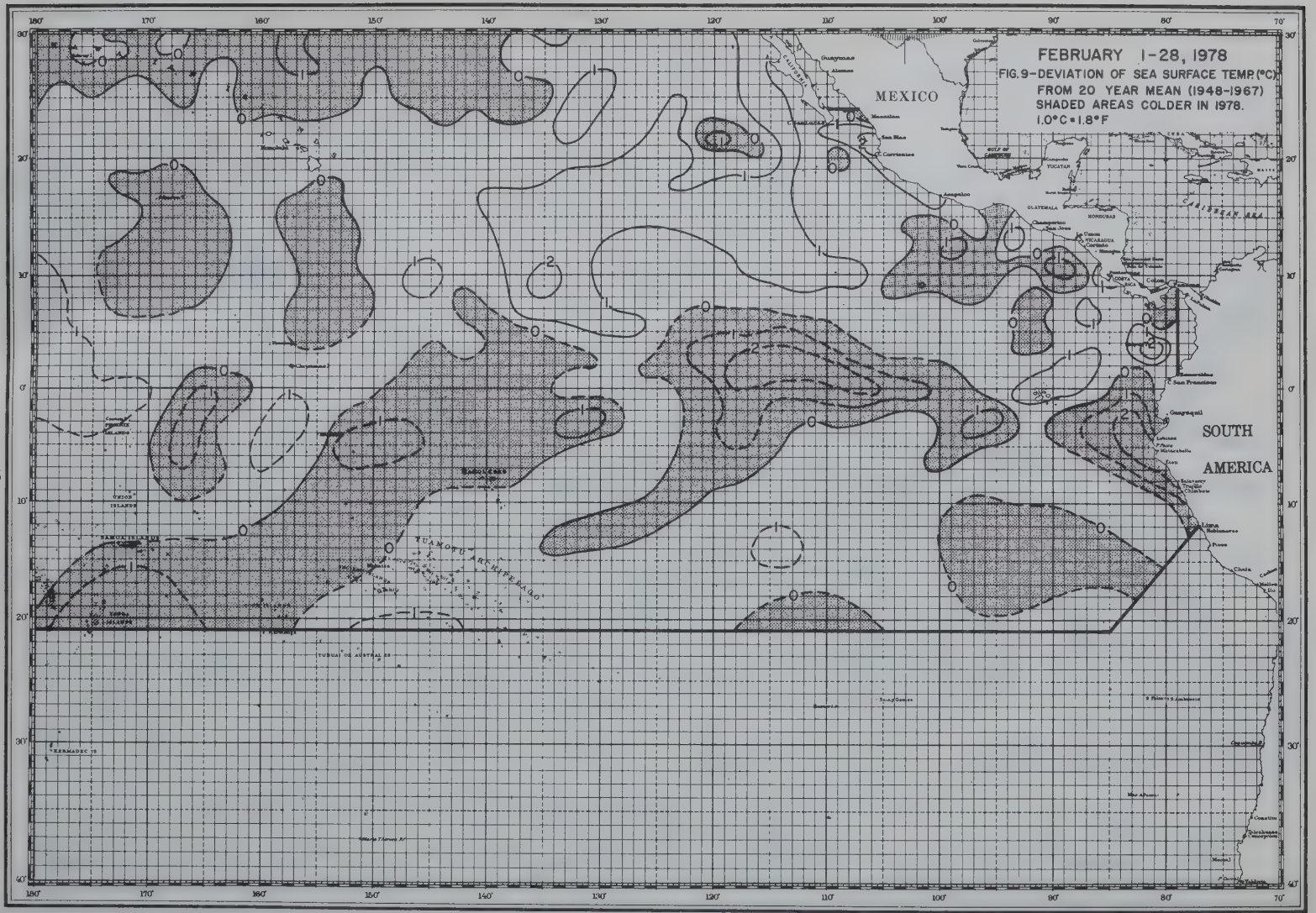
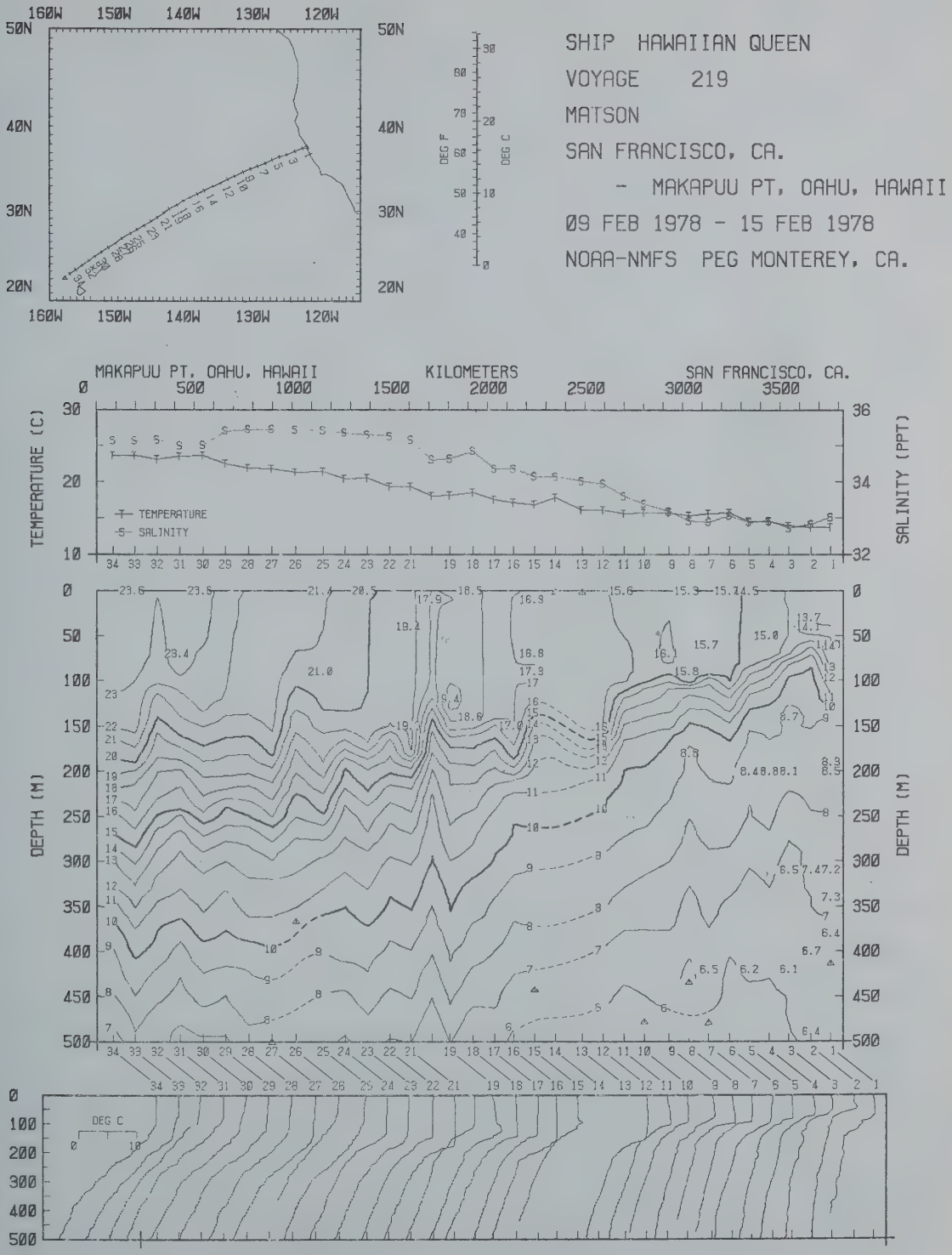

FEBRUARY 1-28, 1978
FIG. 9-DEVIATION OF SEA SURFACE TEMP. (°C) FROM 20 YEAR MEAN (1948-1967) SHADED AREAS COLDER IN 1978.
1.0°C = 1.8°F
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
TUAMOTU ARCHIPELAGO
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°

FIGURE 10


160W 150W 140W 130W 120W
50N
40N
30N
20N
DEG F
DEG C
SHIP HAWAIIAN QUEEN
VOYAGE 219
MATSON
SAN FRANCISCO, CA.
- MAKAPUU PT, OAHU, HAWAII
09 FEB 1978 - 15 FEB 1978
NOAA-NMFS PEG MONTEREY, CA.
MAKAPUU PT, OAHU, HAWAII
KILOMETERS
SAN FRANCISCO, CA.
0 500 1000 1500 2000 2500 3000 3500
TEMPERATURE (C)
SALINITY (PPT)
TEMPERATURE
SALINITY
DEPTH (M)
DEG C

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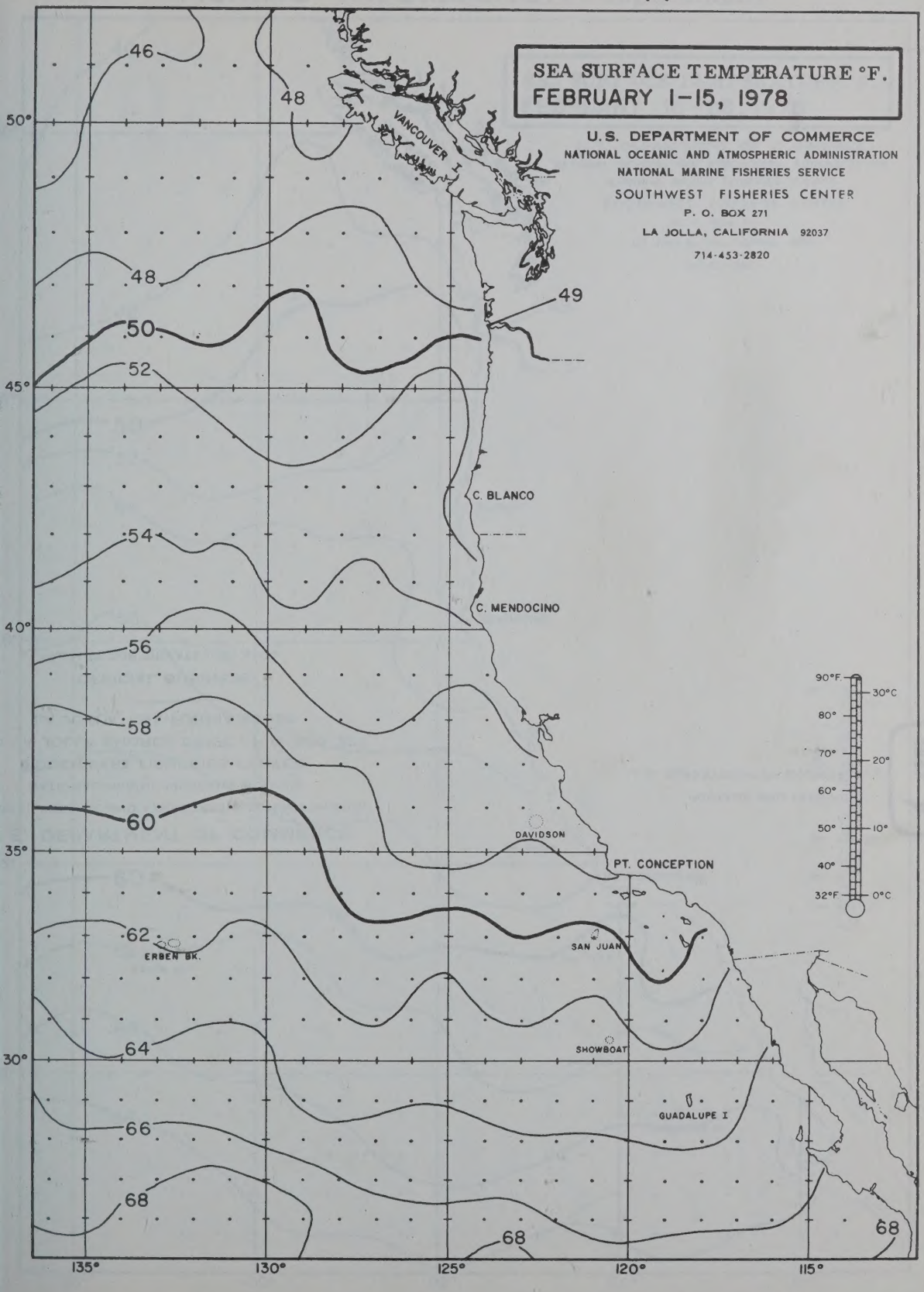

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